WHAT IS CLAIMED IS:

1. A jet engine assembly comprising:

a turbofan jet engine, the turbofan jet engine having an engine core for powering a fan, the engine core producing an engine core flow and the fan producing a fan flow; and

an unsteady flow ejector having a multi-bladed rotor, the rotor being disposed within the engine core flow and rotating in response to a transfer of momentum therefrom;

wherein rotation of the rotor within the engine core flow generates a plurality of high velocity, low density rotating jets and a plurality of low pressure voids, each of the voids being spaced between two of the jets, each of the voids entraining a portion of the fan flow, the jets and the entrained portion of the fan flow mixing to produce a mixed flow having a relatively higher flow rate and a relatively lower velocity than the engine core flow.

2. The jet engine assembly of Claim 1, wherein the rotor includes a hub and a plurality of blades, each of the blades being fixed to the hub and having a face portion, an end portion and a relieved portion, each of the relieved portions having a cavity, each of the cavities emanating from a point on an outer surface of a respective one of the blades and tapering downwardly toward the hub and outwardly toward the end portion, wherein the cavity operates a flow channel for the fan flow to increase a rate with which the fan flow is entrained.

3. The jet engine assembly of Claim 1, further comprising a duct having a hollow cavity, the turbofan engine being coupled to the duct and at least partially disposed within the hollow cavity.

4. The jet engine assembly of Claim 1, wherein the turbofan engine and the unsteady flow ejector are disposed within the duct.

5. A noise suppressor for attenuating noise associated with a high-velocity discharge flow, the noise suppressor comprising:

an unsteady flow elector having a multi-bladed rotor that is adapted to be disposed in the discharge flow and rotate in response to a transfer of energy therefrom, the rotor having a blade spacing that generates a plurality of high-velocity, low density rotating jets and a plurality of low pressure voids, each of the voids being spaced between an associated pair of the jets, the low pressure voids operably entraining a secondary flow of air.

6. A jet engine assembly comprising:

an inlet for providing an inlet flow of air;

a turbojet engine having a turbine and a combuster, the turbojet engine receiving at least a portion of the inlet flow of air and generating a propulsive primary flow; and

an unsteady flow ejector having a multi-bladed rotor, the rotor being disposed within the primary flow and rotating in response to a transfer of momentum therefrom, the rotor employing the primary flow to generate a plurality of high velocity, low density rotating jets and a plurality of low pressure voids, each of the voids being spaced between an associated pair of the jets, the unsteady flow ejector being selectively operable for entraining a secondary flow of air into voids;

the jet engine assembly being operable in a first mode wherein the secondary flow is a flow of ambient air that is introduced directly into the unsteady flow ejector, each of the voids entraining a portion of the ambient flow, the jets and the entrained portion of the secondary flow mixing to attenuate a noise level of an exhaust flow of air exiting the turbojet engine.

7. The jet engine assembly of Claim 6, wherein the jet engine assembly is further operable in a second mode wherein the secondary flow includes a flow of bypass air, the bypass air being directed from the inlet around the combuster and into the unsteady flow ejector, each of the voids entraining a portion of the secondary flow, the jets and the entrained portion of the secondary flow mixing to augment a level of thrust produced by the turbojet engine.

8. The jet engine assembly of Claim 7, wherein the secondary flow also includes a boundary-layer bleed flow when the jet engine assembly is operating in the second mode.

9. The jet engine assembly of Claim 7, wherein the jet engine assembly is further operable in a third mode wherein the secondary flow includes a boundary-layer bleed flow, the boundary-layer bleed flow being directed from the turbojet engine into the unsteady flow ejector, each of the voids entraining a portion of the secondary flow, the jets and the entrained portion of the secondary flow mixing to augment a level of thrust produced by the turbojet engine.

10. The jet engine assembly of Claim 9, wherein the secondary flow also includes an engine cooling air flow when the jet engine assembly is operating in the third mode.

11. The jet engine assembly of Claim 9, further comprising a variable geometry nozzle.

12. The jet engine assembly of Claim 6, wherein the rotor is mounted for rotation on a turbine shaft that rotatably supports the turbine.

13. The jet engine assembly of Claim 6, wherein the rotor includes a hub and a plurality of blades, each of the blades being fixed to the hub and having a face portion, an end portion and a relieved portion, each of the relieved portions having a cavity, each of the cavities emanating from a point on an outer surface of a respective one of the blades and tapering downwardly toward the hub and outwardly toward the end portion, wherein the cavity operates a flow channel for the secondary flow to increase a rate with which the secondary flow is entrained.